

REMARKS

The Office Action mailed on May 23, 2006, has been reviewed and the comments of the Patent and Trademark Office have been considered. Prior to this paper, claims 1-11 were pending. By this paper, Applicant does not cancel any claims, and adds claims 12-14. Therefore, claims 1-14 are now pending.

Applicant respectfully submits that the present application is in condition for allowance for at least the reasons that follow.

Indication of Allowable Subject Matter

Applicant thanks Examiner Lum-Vannucci for indicating that claims 2-5 contain allowable subject matter. Applicant has amended these claims to place them into independent form by incorporating the recitations of claim 1, as last examined, therein.

Claim Rejections Under 35 U.S.C. §103(a)

In the Office Action, Claims 1 and 6-11 are rejected under 35 U.S.C. §103(a) as being unpatentable over Kurishige (U.S. Patent No. 6,736,236) in view of Adler (U.S. Patent No. 5,469,928). In order to advance prosecution, and without prejudice or disclaimer, Applicant amends the claims as seen above, and respectfully submits that the claims, at least as amended, are allowable for at least the following reasons.

Applicants rely on MPEP § 2143, which states that:

[t]o establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference

(or references when combined) must teach or suggest all the claim limitations.

It is respectfully submitted that at least the first and third criteria of MPEP § 2143 cannot be met as detailed in the Office Action, and that the first requirement was not met even before the above amendments to the claims.

The Cited References Do Not Suggest All Claim Recitations

Even if the first requirement of MPEP § 2143 was satisfied in the Office Action (which it is not, as explained below), the cited references still do not meet the third requirement, which is that “the prior art reference (or references when combined) must teach or suggest all the claim limitations.”

Claim 1 now recites a steering apparatus for controlling left and right drive wheels of a vehicle, comprising, among other elements, “a steering force correcting section to correct the steering assistance force so as to compensate the steering reaction force **by varying the steering assistance force [added by a power assistance device] in accordance with a turning direction of the vehicle.**”

The invention of claim 1 is directed at preventing an undesirable steering operation from being executed by a driver of a vehicle having left and right driving forces on left and right drive wheels that are individually controlled. In this regard, the present inventor believes that a difference in the driving forces between the outer and inner individually driven wheels causes a steering reaction force which forces the driver to input an unnaturally heavy or light steering force to drive the vehicle in a desired turning radius or to hold the steering wheel at a desired steering angle. The invention of claim 1 provides a steering technique for compensating a steering reaction force originating from a difference in driving forces between a pair of right and left steerable wheels of a vehicle to prevent an undesired steering operation. This is accomplished by compensating the steering reaction force by varying the steering assistance force provided by the power assistance device ***in accordance with a turning direction of the vehicle.*** That is, the steering assistance force provided by the power

assistance device will be different depending on whether the vehicle is turning towards the left or the right.

For example, during a cornering operation of the vehicle, the driver holds the steering wheel at a desired steering angle against a steering reaction force while receiving a lateral acceleration. In this course, an abrupt change of the steering force may give the driver an unnatural drive feeling. The steering apparatus modifies the required steering force so as to make the steering operation heavier to prevent such an unnatural feeling. In an opposite case, when a steering reaction force acts in a counterclockwise direction corresponding to the left steering direction on steering wheel, and thereby makes the steering input force to be input by the driver too heavy, the steering apparatus modifies the required steering force so as to make the steering operation lighter to prevent such an unnatural feeling. This opposite case occurs because of a structural difference in the suspension mechanism. *In such instances, the steering apparatus modifies the required steering force to a value substantially equal to a required steering force that is assumed when there is no difference in the driving forces between the left and right wheels.* This difference being different depending on the turning direction.

Neither Kurishige nor Adler teach this feature of claim 1. As is correctly recognized in the Office Action, Kurishige does not disclose individual driving means for the left and right drive wheels, and thus does not suffer from the problems identified by the present inventor in view of a difference in the driving forces between the outer and inner individually driven wheels, as the outer and inner wheels (left and right wheels) of Kurishige are not individually driven. Indeed, the steering shaft reaction force of Kurishige, “*Tran*,” **is not** a steering reaction force resulting from differences in left and right wheel driving forces, as is detailed in Kurishige at col. 6, lines 33-67. Kurishige does not teach the added feature of claim 1, in addition to its other deficiencies vis-à-vis claim 1.

Adler teaches a system to assist a steering operation by differentiating the driving forces of left and right drive wheels that are independently controlled. However, Adler fails to disclose or suggest a system that varies a steering assistance force produced by a power assistance device *in accordance with a turning direction of the vehicle*. That is, the device

of Adler provides steering assistance force irrespective of the turning direction of the vehicle. Indeed, it appears that Adler discloses his invention without once referring to a direction of turn (although Fig. 1 appears to schematically depict a left turn). Thus, Adler cannot remedy the deficiencies of Kurishige with respect to claim 1, and thus claim 1 and its dependencies are not obvious.

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Claim 8, as amended, recites a steering process for controlling left and right steerable drive wheels of a vehicle, comprising, among other things, varying the steering assistance force so as to compensate a steering reaction force acting on the steering input device in accordance with the difference between the left and right driving forces **when the driving force of one of an outer drive wheel of the drive wheels outside of a turning radius of the vehicle, and an inner drive wheel of the drive wheels inside of the turning radius of the vehicle is varied**. As recognized in the Office Action, Kurishige does not teach or suggest independent drive forces of individual drive wheels. Adler does not specify varying a driving force on one of an inner and outer drive wheel as claimed. Therefore, claim 8 is not obvious.

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Claim 9 recites a steering apparatus for controlling left and right steerable drive wheels of a vehicle, comprising, among other things, ***means for calculating a steering reaction force caused in a steering input device by a left and right driving force difference between the left and right driving forces***, and a means for varying a steering assistance force so as to compensate the steering reaction force. Again, as recognized in the Office Action, Kurishige does not teach or suggest independent drive forces of individual drive wheels, and thus does not have a steering reaction force caused in a steering input device by a left and right driving force differential. Assuming *arguendo* that the teachings of Adler, when implemented, do result in a steering reaction force, Adler does not teach the calculation of that alleged steering reaction force. Claim 9 and its dependencies are thus not obvious.

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In sum, even if the first requirement of MPEP § 2143 is satisfied, the third requirement of MPEP § 2143 is not satisfied in the Office Action, since the cited references do not teach each and every element of the present invention. Thus, the present claims are allowable.

Lack of Suggestion or Motivation to Modify or Combine the References

MPEP § 2143.01 states that “the *prior art must* suggest the desirability of the invention.” (MPEP § 2143.01, subsection 1, emphasis added.) That is, motivation to combine must be found in the prior art. It is not enough that the combination result in advantages obtained by the claimed invention, as combining references to arrive at an invention almost necessarily results in those advantages, meaning that upon satisfying the third requirement of MPEP § 2143, the first requirement would automatically be satisfied. Thus, utilizing advantages to find motivation to combine would eviscerate the first requirement of MPEP § 2143.

Specifically, the Office Action asserts that (i) it would have been obvious to modify Kurishige with the teachings of Adler “so as to provide the *proper* determination of steering assistance force, and thus *increase accuracy* of the steering reaction system.” (Emphasis added.) The Office Action goes on to assert that (ii) “[u]tilization of individual motors for drive wheels is known, and since motor torque affects the force, and feel, of the steering wheel (the motors and steering wheel being mechanically coupled to each other), it would have been obvious to include these factors in the steering assist system.” With respect to “i,” the Office Action does not point to where such is found in the prior art, and Applicant submits that the prior art does not suggest the desirability of the invention, even if the proffered advantages would result from the alleged combination. The ordinary artisan would not have known that the use of individually controlled motors would provide “proper” determination of steering assistance force and/or increased accuracy of the reaction system. Indeed, it is unclear whether such is even the case once individual motors are utilized. In this regard, Applicant has identified the use of individual motors as imparting an awkward feeling

on the drive of a vehicle, and has established a regime to compensate for this awkward feeling.

With respect to “ii,” assuming *arguendo* that the “motors and steering wheel [are] mechanically coupled to each other,” this would also be the case in a front wheel drive vehicle with only one motor powering both steered wheels. That is, “ii,” is a truism applicable to most vehicles in existence, as an overwhelming number of cars are front wheel drive cars, and thus does not render obvious the addition of individually controlled driving forces of left and right drive wheels. In other words, the physical phenomenon associated with individually controlled wheels asserted as warranting modification of Kurishige is present in cars with front wheel drive systems having only one motor, and thus is not dependent on whether there is one or more than one motor. Also, the mere fact that “motor torque affects the force and feel of the steering wheel,” is not motivation to modify Kurishige to utilize individual drive motors.

Moreover, it is unclear how wheel drive motors that are *mechanically linked* to the steering wheel plays any part in motivating the ordinary artisan to arrive at the present invention. The motors are mechanically linked to the wheels, and the steering wheel is presumably also mechanically linked to the wheels. However, the motors of Adler are likely fixed to the frame and thus do not move with the respective wheel as it turns, the respective motors being gimbally connected to the respective wheels, just as the single motor in a vehicle does not move as the wheels move to turn left and right.

Because of this, a *prima facie* case of obvious has not been established.

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There is no need to modify Kurishige as proffered in the Office Action, as Kurishige works perfectly fine with its arrangement. Indeed, Kurishige does not suffer from the problem addressed by the present invention – the awkward feeling of a driver during steering with a vehicle utilizing individually controlled left and right driving forces. Moreover, even if, *arguendo*, it would have been obvious to add individual motors as proffered in the Office

Action, there is still no motivation to modify the references to arrive at the added recitations to the claims.

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MPEP § 2143.01, subsection 6 states that “the proposed modification cannot change the principle of operation of a reference – If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d 810 (CCPA 1959).” In *Ratti*, the CCPA held that the “suggested combination of references would require a substantial reconstruction and redesign of the elements shown in the primary reference.” This substantial redesign would have resulted in changing a rigid seal to a resilient seal. Thus, a reference cannot be modified to render an invention obvious if the modification changes a principle of operation of the reference.

With the above in mind, it is respectfully submitted that because the teachings of Kurishige rely on the principle of utilizing a single motor to provide driving forces to the wheel(s), substituting individual motors for each steered wheel of a vehicle for the single motor of Kurishige would change the principle of operation of Kurishige. Because modifying Kurishige to utilize individual drive motors for each wheel changes the principle of operation of Kurishige, just as changing the rigid seal to a resilient seal was found to change the principle of operation in *Ratti*, “the teachings of [Kurishige] are **not sufficient** to render the claims *prima facie* obvious.” (MPEP § 2143.01, emphasis added.)

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In summary, because of the lack of suggestion or motivation in the prior art to modify the reference, the first requirement of MPEP § 2143 has not been met and, hence, a *prima facie* case of obviousness has not been established.

New Claims

Applicant has added new claims 12-14. These claims are allowable for at least the reason that the alleged combination does not teach or suggest these additional elements, in addition to the deficiencies of the combination as detailed above.

Support for these new claims may be found, among other places, at paragraphs 26-29 of the application as originally filed.

Conclusion

Applicant believes that the present application is in condition for allowance. Favorable reconsideration of the application is respectfully requested.

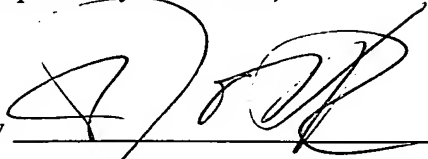
The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by a check being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicants hereby petition for such extension under 37 C.F.R. § 1.136 and authorizes payment of any such extensions fees to Deposit Account No. 19-0741.

Examiner Lum-Vannucci is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

Respectfully submitted,

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